DOCUMENT RESUME

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ABSTRACT

In this activity, students design and create a LEGO (plastic building blocks) structure to house and protect a temperature sensor. The structure is left in a safe spot and the temperature is regularly checked and charted. This activity uses a time frame of 45 minutes. (Author/SOE)

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Activity: **Design Weather Instruments using Lego Sensors**

GRADE LEVELS: 3-5

SUMMARY:

Students will design and create a Lego structure that will house and protect a temperature sensor. They will leave the structure in a safe spot and check the temperature regularly and chart it.

LEVEL OF DIFFICULTY [1 = Least Difficult : 5 = Most Difficult]

4-difficult

TIME REQUIRED

45 minutes

COST

none, if the school has robotic Lego kits with temperature sensors

STANDARDS:

1.1 Identify materials used to accomplish a design task based on a specific property.

1.2 Identify and explain the appropriate materials and tools to construct a given prototype safely.

WHAT WILL THE STUDENTS LEARN?

Temperature changes over time, and is not always constant.

Graphing techniques.

Data collection methods.

Design techniques

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BACKGROUND INFORMATION:

A temperature sensor measures the temperature of the surrounding air. The Farenheit and Celsius scales are ways to measure how hot or how cold something is.

Charts are a good way to record data during a scientific experiment.

A line graph is a way to graph the change in temperature over time.

RECOMMENDED RESOURCES:

www.teamlogisticscorp.com/media01c.htm - information on temperature monitoring devices

www.temperatures.com/sensors.html - information on temperature sensors

MATERIALS:

Lego's

Temperature sensor

Graph paper or graphing worksheet

Data collection worksheet

Paper

Pencils

PREPARATION:

Assemble Lego's and temperature sensors

Photocopy graphing and data collection worksheets for students

DIRECTIONS:

1. Set up a table with assorted Lego's for the students to use.

2. Introduce students to the temperature sensor. Show the students an example of the sensor and explain what it does.

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3. Tell the students that their task is to build a structure with a temperature sensor attached to it. Their structure will keep a record of the temperature over a week, and the students will check it regularly.

4. Arrange the students in teams of three or four.

5. Have the students brainstorm an idea of what they wish to build. Have them draw a sketch of their structure.

6. Allow the students to go to the Lego table and take the pieces that they will need to build their structure, including a temperature sensor. Remind students that they must include the temperature sensor somewhere in their design.

7. After the students have built their structures, have different groups show the class their structure. Make sure that they show and discuss where they put their temperature sensor and why.

8. After the groups have completed their structures and have had a chance to show them to the class, have the groups each place their structures somewhere around the classroom. Tell the students they may place them wherever they want but that the place has to be safe for the structure so that it will not be disturbed. (Encourage students to place their structures in different places such as by a sunny window, next to a heater, in a dark corner, in a place where part of the day it is sunny and part of the day it is dark, etc.)

9. Discuss data collection and grahing with the class. Have students use the data collection worksheet provided, or graph paper to create a chart in which to record the temperature of their structure and the date and time that they observed the temperature. Have the students record the initial temperature of their structure.

10. For the next week have students check their structure two or three times a day. (Morning, lunch time, and before school ends are suggested times).

11. At the end of the week have the students visually represent the data that they have collected. Have the groups discuss their results. Ask students if they see any pattern in the temperatures they recorded.

12. After the students have had time to discuss their results in their groups have each group present their results to the class, make sure that the groups tell the rest of the class about the location of their structure.

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13. On the blackboard write each groups findings, and the location of their structure.

14. Once each group has shared their results ask students to look at the whole classes results and discuss in their groups any conclusions they can make from all the groups results. Allow the students to discuss this for five minutes.

INVESTIGATING QUESTIONS:

Are there any patterns to the temperature results?

Was the temperature constant throughout the week? A day? Why?

What can alter temperature?

How does the amount of sunlight affect the temperature?

When was the temperature the greatest? The lowest?

Where in the room was the temperature the greatest? The lowest? Why?

REFERENCES:

none

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Rubric for Performance Assessment						
Activity Title:	Design Weather Instruments using Legos			Grade Level		
	1	2	3	4		
Criteria	Beginning	Developing	Proficient	Advanced	Weight (X factor)	Subtotal
CONSTRUCTION OF WEATHER INSTRUMENT	Student did not construct a weather instrument.	Construction is sloppy.	Construction is sturdy and well-built.	Construction is well thought-out, creative, and goes beyond expectations.		
TEAMWORK	Student did not work with the group in constructing the instrument or collecting data.	Student helped slightly, but did not work well with the group.	Student participated in most of the group work.	Student worked well in the group and played an active role in construction and data collection.		
					Total:	
Teacher Comments:						

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Temperature Data Collection Chart Name: _____

Location of Temp Sensor:		
Date	Time	Temperature Reading (F)

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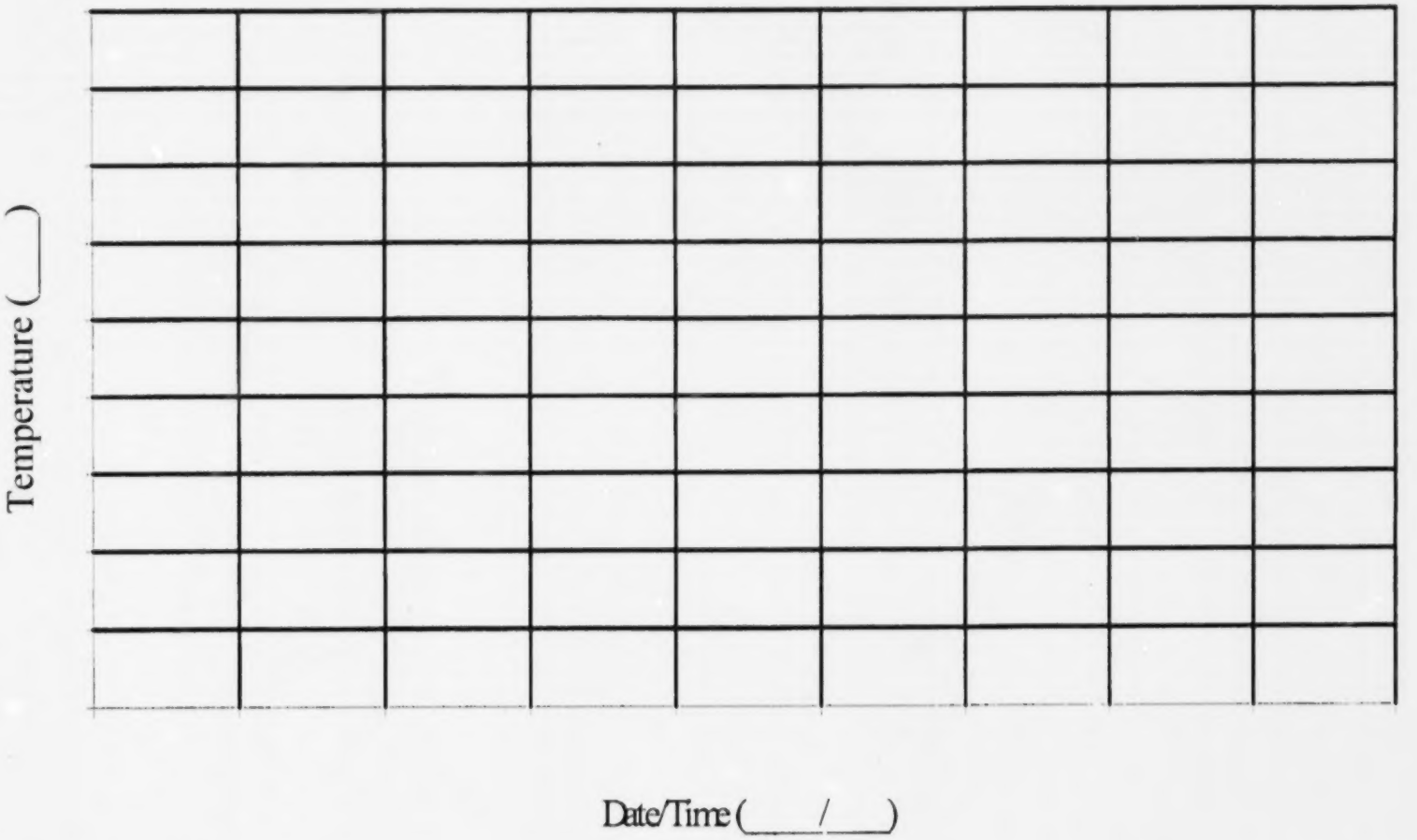
TITLE: _____



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Activity Evaluation Form

Activity Name: _____

Grade Level the Activity was implemented at: _____

Was this Activity effective at this grade level **(if so, why, and if not, why not)**?

What were the Activity's strong points?

What were its weak points?

Was the suggested Time Required sufficient (if not, which aspects of the Activity took shorter or longer than expected)?

Was the supposed Cost accurate (if not, what were some factors that contributed to either lower or higher costs)?

Do you think that the Activity sufficiently represented the listed MA Framework Standards (if not, do you have suggestions that might improve the Activity's relevance)?

Was the suggested Preparation sufficient in raising the students' initial familiarity with the Activity's topic (if not, do you have suggestions of steps that might be added here)?

If there were any attached Rubrics or Worksheets, were they effective (if not, do you have suggestions for their improvement)?

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2) Invent a Backscratcher from Everyday Materials, Grades PreK-2
http://www.prek-12engineering.org/data/d28/Backscratcher.pdf

3) Compare Human-Made Objects with Natural Objects, Grades PreK-5
http://www.prek-12engineering.org/data/d34/HumanvsNatural.pdf

4) Do Different Colors Absorb Heat Better?, Grades PreK-2
http://www.prek-12engineering.org/data/d37/Absorbheat.pdf

5) Which Roof is Tops?, Grades PreK-2
http://www.prek-12engineering.org/data/d44/RoofTops.pdf

6) Make Your Own Recycled Paper, Grades PreK-2
http://www.prek-12engineering.org/data/d56/Recycle.pdf

7) Build an Approximate Scale Model of an Object Using LEGOs, Grades 3-5
http://www.prek-12engineering.org/data/d3/LegoScaleModel.pdf

8) Design Weather Instruments using Lego Sensors, Grades 3-5
http://www.prek-12engineering.org/data/d4/LegoWeather.pdf

9) Space Shelter, Grades 3-5
http://www.prek-12engineering.org/data/d5/SpaceShelter.pdf

10) Build a Bird House, Grades 3-5
http://www.prek-12engineering.org/data/d6/BirdHouse.pdf

11) Ball Bounce Experiment, Grades 3-5
http://www.prek-12engineering.org/data/d6/BallBounce.pdf

12) Make an Alarm!, Grades 3-5
http://www.prek-12engineering.org/data/d11/MakeAlarm.pdf

13) Design Packing to Safely Mail Raw Spaghetti, Grades 3-5
http://www.prek-12engineering.org/data/d17/MailSpaghetti.pdf

14) Disassemble a Click Pen, Grades 3-5
http://www.prek-12engineering.org/data/d33/clickPen.pdf

15) Construct And Test Roofs for Different Climates, Grades 3-5
http://www.prek-12engineering.org/data/d35/ClimateRoof.pdf

16) Compare Fabric Materials, Grades 3-5
http://www.prek-12engineering.org/data/d36/Fabric.pdf

17) A House is a House for Me, Grades 3-5
http://www.prek-12engineering.org/data/d52/House.pdf

18) Water Filtration, Grades 3-5
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19) What is the Best Insulator: Air, Styrofoam, Foil, or Cotton?, Grades 3-5
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20) Design a Recycling Game!, Grades 3-5
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21) Tower Investigation and the Egg, Grades 6-8
http://www.prek-12engineering.org/data/d7/TowerEgg.pdf

22) Wimpy Radar Antenna!, Grades 6-8
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23) Portable Sundial, Grades 6-8
http://www.prek-12engineering.org/data/d30/PortableSundial.pdf

24) An Introduction To Loads Acting on Structures, Grades 6-8
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25) Design Your Own Rube Goldberg Machine, Grades 6-8
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26) Building Tetrahedral Kites, Grades 6-8
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27) Do as the Romans: Construct an Aqueduct!, Grades 6-8
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28) Build an Earthquake City!!, Grades 6-8
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29) Design a Parachute, Grades 6-8
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30) The Squeeze is On, Grades 6-8
http://www.prek-12engineering.org/data/d42/Squeeze.pdf

31) Stop The Stretching, Grades 6-8
http://www.prek-12engineering.org/data/d43/StopStretching.pdf

32) Speaker Project, Grades 9-10
http://www.prek-12engineering.org/data/d13/Speaker.pdf

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